



# Canadian Arctic Resources Committee

CANADIAN ARCTIC RESOURCES COMMITTEE

## BRIEFING MATERIAL TO THE

### YUKON NORTH SLOPE PROJECT REVIEW GROUP

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Whitehorse, Yukon

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CARC ALASKA YUKON NORTH SLOPE PROJECT REVIEW GROUP

I. CARC Position

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## I. CARC's Position

CARC appears here today under protest, for we are most disturbed about the evaluative process DIAND is forcing upon you. We do not understand how you can possibly conduct a rigorous analysis of the projects before you given the time constraints imposed by the Minister. Furthermore, the membership of the project review group is clearly incomplete, for neither the Dene Nation nor the Government of the Northwest Territories is represented on the review group. We are also most unhappy with the lack of due process adopted by the group for you have prohibited verbal questioning of the proponents by interested groups. This ensures that your review will be superficial.

Nevertheless, we want to provide this group with information that should assist you in your deliberations. Our material was prepared at short notice. To be frank, we were appalled by the brief DIAND presented to you last week. It was cursory, superficial and did not address the most important questions that you must answer. Upon reading DIAND's brief we were convinced we should appear before you.

This project review group has the unenviable task of evaluating development projects proposed in an area withdrawn from disposition in 1978 for "national park and other conservation purposes." To provide worthwhile advice to the Minister of DIAND and the YTG you must:

- a) reaffirm conservation as the primary land use in the northern Yukon,
- b) suggest how industry's need for shore and harbour facilities in the Beaufort Sea region can be met, and
- c) suggest a timetable or sequence of events that will implement the primary goal of conserving the northern Yukon.



## First Principles

The various development projects that are before you and the reaction to them by the Department of Indian Affairs and Northern Development and the Yukon Territorial Government ignore clear policy commitments that have been made regarding this area. These two organizations are operating as if the Berger Inquiry, the report of the National Energy Board, the 1978 land withdrawal, and the COPE agreement in principle never happened. Let us refresh your memory:

1. Berger report: "It is likely that industrial development in the coastal calving and post calving grounds would reduce the Porcupine caribou herd to a remnant (emphasis added).

"The region should not be open to any other future proposal to transport energy across it, or to oil and gas exploration and development in general....The Northern Yukon must be formally designated as an area in which industrial development of any kind is to be totally and permanently excluded. I therefore urge the Government of Canada to reserve the Northern Yukon as a wilderness park."

2. National Energy Board: "The main concerns underlying the environmental unacceptability of the northern section of the Prime Route are centered around the Porcupine Caribou Herd in the Yukon coastal area and the Beluga whales, snow geese, and swans in Shallow Bay...The Board is not convinced that mitigative measures could adequately assure protection of this wildlife. The possibility of elimination or significant diminution of the numbers of these mammals and birds is too great a risk to accept if it can be avoided (emphasis added)."



3. The Land Withdrawal: In July 1978, 15,000 sq. mi. of the northern Yukon was withdrawn from disposition under section 19(c) of the Territorial Lands Act. The withdrawal order stated:

"The lands...are required for a national park and other conservation purposes,"

and reflected the Minister of DIAND's view that:

"The conservation values of the region exceed the developmental potential and we must reserve all the land north of the Porcupine and Bell rivers."

4. Inuvialuit Land and Rights Settlement Agreement in Principle:

"National Wilderness Public Dedication"

Canada agrees to establish a National Wilderness Park for the purpose of wildlife protection and wilderness conservation of not less than the 5,000 square miles of traditional lands of the Inuvialuit in the northern Yukon...."

"Canada shall also consider the strong recommendation of the Inuvialuit that Canada act upon the Report of the Mackenzie Valley Pipeline Inquiry recommendation that the entire northern area of the Yukon north of the Porcupine River....".

II. Reaffirming the Conservation Objective

Bearing in mind the lengthy and rigorous inquiries that have already dealt with this area, the project review group should ask those who would industrialize the northern Yukon just what has changed? Was Berger wrong to conclude industrialization on the calving grounds would reduce the porcupine caribou herd to a remnant? Was the NEB wrong to



conclude that mitigative measures could not adequately protect wildlife on the northern Yukon? CARC supports and defends the recommendations made by these inquiries.

Those who would now alter policy and permit industrial development on the Yukon north slope must challenge the conclusions of these two inquiries. This has not been done. In fact, the DIAND brief to this project review group failed even to mention the findings of Justice Berger or the National Energy Board!

This project review group should reaffirm conservation as the primary and overriding objective for the northern Yukon. Wildlife conservation is a valid and defensible use of land. Moreover, in the northern Yukon, conservation objectives are linked to our international responsibilities as well as national, territorial, and local interests.

Conserving the northern Yukon requires that the area be treated as a single unit. Any land use plan for the northern Yukon must recognize the area's integrity. Dividing the region into units and permitting large scale industrial development, as is proposed in the YTG's Northern Yukon Resource Management Model, does not make sense.

Should any development be permitted in the northern Yukon, its scale and timing must be determined by the overriding conservation objective. In short, in the northern Yukon, conservation is the primary goal that limits development. Any proponents of development must show clearly and precisely how and why their projects will not interfere with conservation aims.

Implementing the conservation objective should be the most urgent task facing government. A timetable to designate all or at least a significant part of the withdrawn area a national park and/or national



wildlife area should be announced as soon as possible. Similarly, a caribou management board with representatives of the federal and territorial governments and all user groups must be established to protect and manage the herd throughout the Canadian portion of its range. This board must have a significant role in habitat management within the northern Yukon national park and/or national wildlife area, and the remaining caribou range to the south. A formal international caribou agreement should be negotiated between Canada and the USA in recognition of the shared nature of the resource being conserved.

Establishing these conservation areas and management institutions should be government's immediate priority for the northern Yukon. Not until these conservation arrangements are in place should government entertain industrial development proposals. After conservation arrangements are implemented developmental proposals can be evaluated through normal environmental impact assessment procedures. Only those projects that do not interfere with the conservation objective as defined in conservation legislation, regulations and management plans should be permitted.

In relation to the long and often bitter struggle over the northern Yukon, those opposing the projects before you have been labelled anti developers. This characterization is false. We are arguing for a planned and managed approach toward development in the Beaufort Sea region, which includes conservation of the northern Yukon as an immediate objective. Numerous studies completed by government point to the inescapable conclusion that the northern Yukon should be managed as a conservation area. The case for conservation is proven. Those who would industrialize the northern Yukon have yet to make their case.



### III. Port Facilities on the Beaufort Sea

#### (a) The Need

Short--term requirements for temporary harbour facilities along the Canadian Beaufort Sea coast are defined by the current hydrocarbon exploration programmes. These requirements can only be projected for the duration of the current exploration agreements between each operating company and the Canada Oil and Gas Lands Administration (COGLA). In the case of Gulf's exploration programme, for example, the exploration agreement signed in 1983 expires in 1987. Three oil companies currently are conducting offshore oil and gas exploration in the Canadian Beaufort Sea. Their requirements for harbour facilities are:

shallow--draft facilities (less than six metres deep) for Esso Resources' nearshore artificial island and caisson island drilling; medium--draft facilities (ten metres deep) for Dome Petroleum's fleet of drillships, supply vessels and ice breakers; medium--draft facilities (ten metres deep) for supply vessels and ice breakers to support Gulf Canada Resources' new floating conical drilling unit (CDU) and mobile arctic caisson (MAC) drilling systems.

An additional short--term harbour requirement, with possible long--term implications, has been identified by Peter Kiewit and Sons Ltd. This harbour would be a loading facility for rock from a proposed quarry.

Long--term requirements (extending beyond five years) for a permanent deep--draft port facility (minimum of 15 metres and likely 20 metres depth) on the Beaufort Sea Coast have not been specified by



potential users such as the oil industry or Canadian Coast Guard. However, industry and government planning, in the form of harbour facility siting studies as well as a recent proposal by Interlog UK and Monenco for a permanent super port on the Yukon coast, are premised on future oil production from offshore areas of the Canadian Beaufort Sea. Not until the location, nature, and scale of such production has been determined can port requirements for construction, servicing and product shipment be defined and a port site chosen to meet the long--term needs of oil development in the region.

(b) Existing Facilities

Three harbours are currently in use along the Canadian Beaufort Sea coast, all east of the Mackenzie Delta: Tuktoyaktuk, McKinley Bay and Wise Bay.

Dome, Esso and Gulf each has a shore base facility and shallow--draft docking facility inside Tuktoyaktuk harbour. The entrance to the natural harbour is only four metres deep, preventing the entry of vessels with greater draft. Dome loads its shallow--draft supply vessels at its docks and Esso operates its nearshore vessel fleet from Tuktoyaktuk harbour. The newly constructed Gulf facility is not intended to accommodate offshore supply vessels. Canadian Coast Guard and Northern Transportation Company Limited also have harbour facilities at Tuktoyaktuk.

Dome Petroleum has used McKinley Bay since 1979 as a medium--draft mooring basin for overwintering its offshore exploration fleet. The harbour facility has accommodated up to 40 vessels at one time, including four drillships, four dredges, 13 supply boats, and two floating camps. A ten--metre--deep entrance channel and a



ten--hectare mooring basin have been maintained by dredging.

Dome Petroleum currently moors an oil tanker at Wise Bay, on Cape Parry, and, in the past, has used Summers Harbour on an adjacent island to overwinter part of its drilling fleet and to repair damage to an ice breaker. Both of these natural harbours have deep waters, with Wise Bay having a natural mooring basin exceeding 20 metres depth. In addition to the above locations, Esso has used Tuft Point as a mooring basin for shallow--draft vessels.

(c) Current Port and Marine Base Proposals

(i) Gulf Marine Base --- Stokes Point

Purpose: marine support base for offshore exploration.

Duration: 1983 to 1987 (duration of Gulf Exploration Agreement)

Port Facility:

10 metre deep by 100 metre wide mooring basin for 2--7.5 metre draft supply vessels, 2--8 metre draft ice breakers, oil tankers, river barges and dredge (conical drilling unit (CDU) to be moored offshore in Herschel Basin during winter);

breakwater created by grounded tankers;

warf;

2.6 million m<sup>3</sup> dredging required from basin;

maintenance dredging requirement not stated.

Land Facility:

20 (40) hectare area;

accommodation for 50 (100) people;

shop, warehouse, fuel storage tanks;

610-metre gravel airstrip for short takeoff and landing aircraft (existing);

400,000 m<sup>3</sup> gravel requirement for construction.



Road:

existing on--site roads only;  
no all--weather road link to south.

Capital Cost:

\$40 million for port facilities;  
\$20 million for land facilities.

Jobs Created:

Unknown

(ii) Kiewit Rock Quarry and Port--King Point

Purpose: Provision of rock to Canadian and U.S. Beaufort Sea exploration companies

Duration: 1984 -- 1986 initially, 20 to 25 year potential.

Port Facility:

6 meter deep harbour for barges or 12 metre deep for bulk carriers (ships);  
4 metre high by 20 metre wide quarry rock causeway and breakwater;  
40 metre wide rock loading wharf (conveyor transfer);  
1 to 2 million tonnes rock shipment annually;  
250,000 m<sup>3</sup> (barge) or 500,000 m<sup>3</sup> (ships) dredging required;  
10,000 m<sup>3</sup> maintenance dredging annually;  
60 day shipment period (July -- August).

Land Facility:

35 hectare area;  
shop, fuel storage tanks rock storage pad;  
accommodation for 175 to 200 people;  
1400 metre gravel airstrip for twin engine aircraft.



Road:

14.5 km haul road built on 1.5 m rock pad;  
winter road from Dempster highway.

Quarry:

3000 hectare area, 14.5 km south of King Point;  
sandstone to be cut by blasting and crushed to 2.5 to 12.5 cm size;  
8.5 month operation (March -- November).

Capital Cost:

Unknown.

Jobs Created:

approximately 270 (seasonal);  
(iii) Kiewit/Gulf Combined Port --- King Point

Purpose: to provide combined port facilities for Gulf offshore  
exploration and Kiewit shipment of rock.

Proponent:

no proposal has been prepared nor land use application made;  
DIAND has proposed the concept.

Port Facility:

no size nor design information available on Gulf's wharf and  
breakwater requirements;  
Kiewit proposal requires only causeway/wharf as shipping to occur  
only during open water;  
Gulf requires protected mooring basin for overwintering vessels and  
shipping of supplies well into the ice season (January).

Capital Cost:

\$185 million estimated by Gulf to meet own requirements alone.



(iv) Interlog (UK)/Monenco Multi--User Port --- King Point

Purpose: permanent marine support base and deep--draft harbour for private and public users including the oil and gas industry (Canadian and Alaskan) regional transport companies, service industries, Canadian Coast Guard and Department of National Defence.

Phases:

- (1) oil exploration in Canadian Beaufort (1984 --1988);
- (2) international port servicing Alaskan Beaufort;
- (3) oilfield development and production in Canadian Beaufort (1990+);
- (4) additional development as required (1990+).

Port Facility:

10 to 12 metre deep dredged channel and harbour (phase 1);  
20 metre deep dredged channel and harbour (phase 2).

Land Facility:

64 km<sup>2</sup> (6400 hectare) development area centred on King Point;  
warehouses, fuel depot, shop, maintenance and fabrication facilities;  
self--contained community housing;  
base administration and operations centre;  
short takeoff and landing airstrip (phase 1);  
all--weather jet port (phase 2).

Road:

all--weather road to Dempster Highway.

Capital Cost:

\$100 million (1984);  
\$500 million (1990).



#### IV. Harbour Siting Studies

Canadian and U.S. government agencies and Canadian oil companies have conducted six separate evaluations of potential harbour sites on the Canadian Beaufort Sea coast since 1970. These studies have reviewed available information on engineering and user requirements, physical conditions, and environmental sensitivities at a total of 21 sites. While the studies were conducted in varying detail, even the most thorough can only be considered preliminary evaluations of permanent port sites because specific engineering and design requirements were defined hypothetically and much necessary site--specific data were not available. The study results point to two potential deep--draft port sites:

west of the Mackenzie River Delta, King Point, with modifications to the anchorage basin and construction of a breakwater, is the most suitable harbour site;

east of the Mackenzie Delta, Wise Bay is the most suitable natural harbour.

##### (a) Canada Department of Public Works, 1973

This study evaluated the engineering feasibility of designing and building a permanent deep--water terminal at four sites along the coast of the Canadian Beaufort Sea and the Amundsen Gulf. Sites at Herschel Island, Babbage Bight (including King Point), Horton River and Clapperton Island were considered. Detailed engineering and cost criteria were defined and evaluated, based upon a hypothetical port facility designed to accommodate year--round operation of a 326,000 DWT ice breaking oil tanker. The evaluation showed Babbage Bight to be the



most favourable location, with deep water (30 metres) within five kilometers of shore and satisfactory sediment and ground conditions for construction of offshore and onshore facilities. The major disadvantage of Herschel Island is a submarine ridge which would prevent vessels requiring more than 14 metres draft from entering Herschel Basin. The disadvantages of the Horton River site were lack of a suitable anchorage and a steep shoreline escarpment. Insufficient information was available for Clapperton Island to allow a definitive evaluation.

(b) U.S. Department of Commerce

Twenty--eight potential deep--draft harbour locations along the coast of Alaska and the Canadian Beaufort Sea were evaluated, four of them in Canada. Babbage Bight (including King Point) was selected as the most suitable site for a deep--water port for oil and gas supertankers. Deep water conditions were defined as 26 metres depth at a distance of five kilometres offshore.

(c) Advisory Committee on Northern Development, 1977

This study evaluated sixteen potential medium--draft port sites, from Herschel Island to Paulatuk, on the basis of operational constraints, costs, oceanographic and meteorological conditions, and environmental sensitivity. Specific engineering criteria were established to meet the temporary harbour needs of Canmar's (Dome Petroleum's) offshore exploration activities, and included a minimum channel depth of six metres and width of 120 metres. Other potential users of such a facility were identified, including addditional exploration companies and Northern Transportation Company Limited. However, the port requirements of these users were not



determined. An evaluation of capital costs, including channel dredging and construction of a breakwater, and operating costs, including materials transporation, was made for each site. Three sites, Letty Harbour, Tuktoyaktuk and King Point were recommended for further study.

(d) Dome Petroleum Limited, 1979

Dome prepared several reports identifying land requirements for future hydrocarbon development in the Beaufort Sea including a preliminary review of potential permanent medium--draft (10 metre) and deep water (17 metre) harbour sites. Ten sites were evaluated in considerable detail, using both quantitative criteria such as amount of material to be dredged and judgemental criteria such as degree of natural protection. Data were not available to define design requirements for the port in more detail, because oil development and production was not yet warranted by the amount of oil discovered. The preliminary harbour evaluation concluded that King Point, allowing for dredging of the anchorage basin and construction of a breakwater, has the best potential for deep draft (17 metre) harbour and shorebase facility to support the company's future hydrocarbon exploration and production plans. Marine advantages included proximity to the centre of current exploration activity, deep water (25 metres) four kilometres offshore, and protection by a band of shorefast ice. Notwithstanding this conclusion regarding King Point's suitability, Dome determined that McKinley Bay was a more favourable location for a floating marine base and began using the Bay as a winter mooring basin for its exploration fleet in 1979. The report also concluded that Wise Bay is the most suitable natural deep--water harbour along the eastern Beaufort Sea coast.



(e) Gulf Canada Resources, Inc., 1982

Gulf reviewed eight potential locations for a temporary marine base and harbour to support its offshore exploration activities and selected four sites for more thorough evaluation: Roland Bay, Stokes Point, King Point, and McKinley Bay. Evaluation criteria were divided into definitive criteria, such as minimum channel depth of 12 metres and width of 150 metres, and relative criteria, such as the need for the facility to allow reliable and flexible support of offshore drilling operations. A qualitative evaluation and ranking of the four sites is presented in the study report. None of the locations were rejected on the basis of failing to meet the definitive criteria. Stokes Point was selected on the basis of a subjective evaluation of the relative criteria, and it was concluded this site has a higher growth potential than King Point. Virtually every other siting study has rated King Point highest in this criterion in the western Beaufort. Cost comparisons are presented for construction and operation of a harbour and marine base at the alternative sites. However, Gulf has subsequently estimated capital costs to be \$60 million at Stokes Point and \$185 million at King Point. Gulf's cost estimates for McKinley Bay were not available.

(f) Canada Department of Indian Affairs and Northern Development, 1983

DIAND evaluated ten potential harbour locations from Herschel Island to Clapperton Island, including a floating base in Herschel Basin, to determine the most appropriate temporary site for medium--to--deep (12 to 14 m) draft harbour and shorebase facility to support Gulf's offshore exploration programme. (This study is summarized in the



enclosed table.) Qualitative and quantitative criteria, such as shore zone stability and median open water period, were used for the evaluation. Data for the evaluation were collected over a very short period (10 days) and a number of quantitative criteria were evaluated only qualitatively. Stokes Point was selected as the preferred location for a base for Gulf's two--rig exploration programme, principally because of its proximity to Gulf's acreage in the western Beaufort Sea and to the Herschel Basin, which would provide winter anchorage for Gulf's floating conical drilling unit (CDU). Stokes Point was judged to be inadequate to support future expansion of exploration activities, or longer--term uses such as hydrocarbon production. Wise Bay was identified as an excellent natural deep--water harbour but was rejected because of its distance from the western Beaufort Sea. King Point was judged to meet both exploration and production (deep--draft part) requirements, but was rejected because of more difficult conditions for onshore construction than Stokes Point and the need to construct a breakwater for protection against moving ice.

#### V. Responding to the Development Projects

The project review group is faced with responding to two development proposals which clearly threaten the northern Yukon conservation objective. Industry, however, says it needs additional port and harbour facilities to support hydrocarbon exploration programmes in the Beaufort Sea. Should hydrocarbon production ever begin, a long term deep water facility will be required.

The review group should affirm the principle of regional land use



DIAND SITING STUDY - RESULTS

SITE	SELECTED	REJECTED	DIAND REASON FOR SELECTION/REJECTION	CARC ANALYSIS
Stokes Point	X		airstrip, roads, existing; on-site gravel available; adequate suitable land for development; proximity to Herschel Basin for winter mooring of CDU	within boundary of proposed National Park, caribou calving occurs near to site; alternatives available if Gulf more flexible in operational requirements - maintenance dredging not considered.
Herschel Basin mooring base	X		human safety and oil pollution risks higher than shore base facility	hazards not defined, quantified or evaluated nor compared to shore base facility. No evidence provided by either DIAND or Gulf, therefore, insufficient reason for rejection.
Kinley Bay	X		cost of dredging to widen, deepen, existing channel and mooring basin used by Dome; effect of wider channel on ice and restrictions to vessel movement (freezing to bottom); cost of maintenance dredging	No consensus on cost of dredging (see Dome's response to siting study).
Point	X		meets all requirements for Gulf operations; further from Herschel Basin (mooring site for CDU) than Stokes Point; more exposed to moving ice than Stokes Point	superior site to Stokes Pt. for other users and permanent port; more detailed analysis of site required
Pauline Cove Herschel Island	X		limited developable land; mooring basin too small; airstrip construction difficult	Agree
Island Bay	X		unsuitable terrain for development; no on-site gravel; no advantages over Stokes Point	Agree
Uktoyaktuk	X		entrance to harbour too shallow; would require large amount of dredging	Agree
Pise Bay	X		410 km from centre of offshore operations considered too far; good harbour and access to developable land	excellent natural harbour for exploration and development; good mooring basin for deep-draft vessels such as supply tankers



SITE	SELECTED	REJECTED	DIAND REASON FOR	CARC ANALYSIS
			SELECTION/REJECTION	
City Harbour		X	too distant from centre of operations area; shallow harbour and small mooring area	Agree
Apperton Island		X	too distant from centre of operations area; otherwise good deep- draft harbour with good access to developable land	Agree
Kinley Bay/ Se Bay	Not Considered			This twin site arrangement should be subjected to a formal costing analysis



planning as the appropriate means to handle this facility siting question. A Beaufort Sea Regional Land Use Planning Commission should have been established immediately after Cabinet's approval of the 1981 Northern Land Use Planning Policy. If such a body had been established, this ad hoc project review group, whose timetable conflicts with the Beaufort Sea EARP, would be unnecessary and the decision of where to locate port facilities would already have been made. The quick and dirty approach to project review, which you are now undertaking, is due to DIAND's lack of preparedness to plan for industry's needs. Your first response, should be to press for a Beaufort Sea regional land use planning commission to develop a plan and framework with which to respond quickly to industry's needs for infrastructure development. Such a planning commission would ensure that land use questions including ports, roads, quarries, etc. are evaluated within a Beaufort Sea region context.

DIAND's port siting study suggests that Stokes Point is the most suitable site to meet Gulf's current offshore exploration requirements. McKinley Bay was rejected on the basis of high dredging costs for widening and deepening the channel and mooring basin currently used by Dome at its McKinley Bay marine base. Other stated disadvantages of the site included unknown costs for maintenance dredging, and the possibility of rabble ice in the entrance channel freezing to the bottom and restricting ship movement.

DIAND has not prepared a detailed cost comparision for dredging of Stokes Point and McKinley Bay. Gulf has estimated \$40,000,000 to dredge Stokes Point and construct a breakwater and causeway. Department of Public Works has prepared an initial estimate of



\$85,000,000 for dredging at McKinley Bay. Following three years of operating experience at McKinley Bay, Dome has estimated \$53,000,000 for dredging at McKinley Bay to accommodate all of Gulf's requirements. Maintenance dredging costs have not been estimated for Stokes Point or McKinley Bay. CARC believes that a joint Gulf/Dome marine base at McKinley Bay is a viable alternative to current development on the North Slope, although it would be more costly than operating a floating base in Herschel Basin. We remind you that Gulf, in its original marine base application to DIAND, was prepared to operate from McKinley Bay.

Wise Bay on Cape Perry was rejected by DIAND because it is 410 km from the centre of Beaufort Sea exploration. However, it is an excellent natural, 20-metre deep harbour, well protected, and would require no dredging. The harbour lies only five km from an existing airstrip at the Cape Perry DEW Line Station. Wise Bay would serve as a suitable location for mooring Gulf's oil tanker. Dome currently has its tanker moored there and shuttles fuel from the location to its operations. Such flexible operating procedures with deep draft vessels moored separately from the supply vessels and ice breakers, would enable Gulf to reduce its dredging requirements at a marine base further to the west.

In summary, the non-northern Yukon alternatives for a marine base to support Gulf's exploration programme are:

- (1) an interim floating base for a period of one to two years while a comprehensive siting evaluation is done (a risk assessment of offshore operations could be conducted during this period);



- (2) a floating base in the Herschel Basin for the duration of Gulf's exploration agreement (1983--1987);
- (3) a joint Gulf/Dome facility at McKinley Bay;
- (4) a flexible marine support operation, with regular supply using Gulf's icebreakers and supply vessels based at McKinley Bay, and intermittent and seasonal requirements met by fuel tankers mooring at Wise Bay and CDU winter mooring off McKinley Bay or in Herschel Basin.

All of these options are preferable to that currently before you.

central to southern off-shore waters and at sea surface (5)  
((1981--86)) showing nothing  
but greater or equal variability (5)  
and often larger scale, temporal changes often small (5).  
The cool material is here also older but evidence of this  
is becoming weaker and at the same time becomes less widespread  
and limited to the cold shelf. The surface waters are still with  
the typical seasonal pattern alternating with zonal waters. The

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